Streptococcus pneumoniae, Drug-Resistant Invasive Disease

Table of Contents

Streptococcus pneumoniae, Drug-Resistant Invasive Disease

Overview[1,2]

Streptococcus pneumoniae is commonly called pneumococcus and the diseases it causes may be referred to as pneumococcal disease. *Streptococcus pneumoniae* may cause pneumonia, meningitis, otitis media or a blood stream infection. *S. pneumoniae* is the leading cause of bacterial meningitis among children <5 years of age. All *S. pneumoniae* isolates from normally sterile body fluids should be tested for antimicrobial susceptibility.[2]

Pneumonia: In adults, pneumococcal pneumonia is often characterized by sudden onset of illness with symptoms including shaking chills, fever, shortness of breath or rapid breathing, pain in the chest that is worsened by breathing deeply, and a productive cough. In infants and young children, signs and symptoms may not be specific, and may include fever, cough, rapid breathing or grunting.

Meningitis: High fever, headache, and stiff neck are common symptoms of meningitis in anyone over the age of two years. These symptoms can develop over several hours, or they may take one to two days. Other symptoms may include nausea, vomiting, discomfort looking into bright lights, confusion, and sleepiness. In newborns and small infants, the classic symptoms of fever, headache, and neck stiffness may be absent or difficult to detect, and the infant may only appear to be slow, inactive, or irritable, have vomiting, or feed poorly.

Otitis media: Children who have otitis media (middle ear infection) typically have a painful ear, and the eardrum is often red and swollen. Other symptoms that may accompany otitis media include sleeplessness, fever and irritability.

Blood stream infections: Infants and young children with blood stream infections, also known as bacteremia, typically have non-specific symptoms including fevers and irritability.

Two pneumococcal vaccines are available for use in children, the heptavalent pneumococcal conjugate vaccines (PCV7) and the 23-valent pneumococcal polysaccharide vaccine (PS23). The PS23 vaccine induces protective antibody responses to the most common pneumococcal serotypes in children 2 years of age or older, and the PCV7 vaccine also induces protective antibody responses in individuals younger than 2 years of age. Ninety pneumococcal serotypes have been identified. Serotypes 4, 6B, 9V, 14, 18C, 19F and 23F (Danish system) are the 7 types contained in the heptavalent pneumococcal conjugate vaccine.

In some areas of the United States up to 35% of the invasive pneumococcal isolates are resistant to penicillin. Serotypes 6B, 9V, 14, 19A and 23F are the most common isolates associated with penicillin-nonsusceptiblity (80% of penicillin-nonsusceptible strains are one of the 7 types contained in the PCV7 vaccine).

For a complete description of *Streptococcus pneumoniae*, Drug-resistant, Invasive disease, refer to the following texts:

- Control of Communicable Diseases Manual (CCDM).
- Red Book, Report of the Committee on Infectious Diseases.
- Epidemiology and Prevention of Vaccine-Preventable Diseases, 7th Edition
- Principles and Practice of Infectious Disease, 5th Edition

Case Definition[3]

Clinical description

Streptococcus pneumoniae causes many clinical syndromes, depending on the site of infection (e.g., acute otitis media, pneumonia, bacteremia, or meningitis).

Laboratory criteria for diagnosis

- Isolation of *S. pneumoniae* from a normally sterile site (e.g., blood, cerebrospinal fluid, or less commonly, joint, pleural or pericardial fluid) **and**
- "Nonsusceptible" isolate (i.e., intermediate or high-level resistance of the *S. pneumoniae* isolate to at least one antimicrobial agent currently approved for use in treating pneumococcal infection.

Case classification

Confirmed: A clinically compatible case that is laboratory confirmed.
Probable: A clinically compatible case caused by laboratory-confirmed culture of *S. pneumoniae* identified as "nonsusceptible" (i.e., an oxacillin zone size of <20 mm) when oxacillin screening is the only method of antimicrobial susceptibility testing performed.

Information Needed for Investigation

Verify the diagnosis. What laboratory tests were conducted? Obtain results of culture and sensitivity tests. What laboratory conducted the testing and what is their phone number? What are the patient's clinical symptoms? What is the name and phone number of the attending physician?

Establish the extent of illness. Determine if household or other close contacts are, or have been ill, by contacting the health care provider, patient or family members.

Notification and Control Measures:

- Contact the Senior Epidemiology Specialist for the region, or the Department of Health and Senior Services' Situation Room (DSR) at 800-392-0272 (24/7) immediately upon learning of a suspected outbreak of pneumococcal disease.
- Contact the Bureau of Child Care (573-751-2450) if cases are associated with a child care facility.
- Contact the Section for Long-Term Care Regulation (573-526-0721) if cases are associated with a long-term care facility.
- Contact the Bureau of Health Facility Regulation (573-751- 6303) if cases are associated with a hospital or hospital-based long-term care facility.

Control Measures

General:

Adults:

Pneumococcal polysaccharide vaccine (PS23) should be administered routinely to all adults 65 years of age and older. The vaccine is also indicated for persons aged ≥2 years with normal immune systems who have chronic illnesses, including cardiovascular disease, pulmonary disease, diabetes, alcoholism, cirrhosis, or cerebrospinal fluid leaks. Immunocompromised persons aged ≥2 years who are at increased risk of pneumococcal disease or its complications should also be vaccinated.(5)

Children:

The PCV7 vaccine is recommended for routine administration as a 4-dose series for all children 23 months of age and younger at 2, 4, 6, and 12 to 15 months of age. Each 0.5mL dose of PCV7 should be administered intramuscularly. PCV7 has been shown to reduce invasive disease caused by vaccine serotypes by 97%, and reduce invasive disease caused by all serotypes, including serotypes not in the vaccine, by 89%.

Revaccination:

Revaccination is recommended for persons 65 years of age or older who received an initial vaccination prior to age 65, if at least 5 years has elapsed since that dose. Revaccination is also recommended for persons less than 65 years of age with anatomic or functional asplenia or those who are immunocompromised, including patients with chronic renal failure and nephritic syndrome. For such patients who are older than 10 years of age, revaccination should take place 5 years or more after the first dose. For younger patients, revaccination should be considered 3 years after the first dose.(4)

Recommended Schedule for Doses of PCV7, Including Catch-up Immunizations in Previously Unimmunized Children[2]

Age at First Dose	Timing of Immunization Series
2-6 months	3 doses, 6-8 weeks apart, then 1 dose at 12-15 months of age
7-11 months	2 doses, 6-8 weeks apart, then 1 dose at 12-15 months of age
12-23 months	2 doses, 6-8 weeks apart
24-59 months; Immunocompetent	1 dose
24-59 months; High risk, including immunocompromised	2 doses, 6-8 weeks apart

Recommendations for Pneumococcal Immunization With PCV7 or PS23 Vaccine for Children at High Risk of Pneumococcal Disease[2]

Age	Previous Dose(s) of Any Pneumococcal Vaccine	Recommendations
≤23 months	None	PCV7, as in previous table
24-59 months	4 doses of PCV7	1 dose of PS23 vaccine at 24 months of age, at least 6-8 weeks after last dose of PCV7. 1 dose of PS23, 3-5 years after the first dose of PS23.
24-59 months	1-3 previous doses of PCV7	1 dose of PCV7. 1 dose of PS23, 6-8 weeks after the last dose of PCV7. 1 dose of PS23, 3-5 years after the first dose of PS23.
24-59 months	1 dose of PS23	2 doses of PCV7, 6-8 weeks apart, beginning at 6-8 weeks after last dose of PS23. 1 dose of PS23 vaccine, 3-5 years after the last dose of PS23.
24-59 months	No previous dose of PS23 or PCV7	2 doses of PCV7, 6-8 weeks apart. 1 dose of PS23 vaccine, 6-8 weeks after the last dose of PCV7. 1 dose of PS23 vaccine, 3-5 years after the first dose of PS23 vaccine.

Children at High and Moderate Risk
Of Invasive Pneumococcal Infection[2]

High risk (attack rate of invasive pneumococcal disease ≥150/100,000 people annually)

- Sickle cell disease, congenital or acquired asplenia, or splenic dysfunction
- Infection with human immunodeficiency virus

Presumed high risk (attack rates not calculated)

- Congenital immune deficiency; some B-(humoral) or T-lymphocyte deficiencies, complement deficiencies (particularly C1, C2, C3, and C4), or phagocytic disorders (excluding chronic granulomatous disease)
- Chronic cardiac disease (particularly cyanotic congenital heart disease and cardiac failure)
- Chronic pulmonary disease (including asthma treated with high-dose oral corticosteroid therapy)
- Cerebrospinal leaks from a congenital malformation, skull fracture, or neurological procedure
- Chronic renal insufficiency, including nephritic syndrome
- Disease associated with immunosuppressive therapy or radiation therapy (including malignant neoplasms, leukemias, lymphomas, and Hodgkin's disease) and solid organ transplantation
- Diabetes mellitus
- Cochlear implants

Moderate risk (attack rate of invasive pneumococcal disease ≥20 cases/100,000 people annually).

- All children 24-35 months of age
- Children 36-59 months of age attending out-of-home child care
- Children 36-59 months of age who are black or of American Indian/Alaska Native descent

General Information on Pneumococcal Vaccines

- Pneumococcal vaccines should be deferred during pregnancy. However, the risk of severe pneumococcal disease in pregnant women should be considered when making decisions regarding the need for pneumococcal immunization.
- Children who have experienced invasive pneumococcal disease should receive all recommended doses of pneumococcal vaccines (PCV7 or PS23) appropriate for age and underlying condition. The full series of scheduled doses should be completed even if the series is interrupted by an episode of invasive pneumococcal disease.
- As appropriate, persons with uncertain or unknown vaccination status should be vaccinated.

- Persons with moderate or severe acute illness should not be vaccinated until their condition improves.
- For both pneumococcal polysaccharide and conjugate vaccines, a serious allergic reaction to a dose of pneumococcal vaccine or a vaccine component is a contraindication to further doses of vaccine.

➢ See the Pneumococcal Infections section of the Red Book for additional recommendations on adolescent prevention and control, to include "Immunization recommendations for children 5 years of age or older".
➢ See the Pneumonia (Pneumococcal) section of the Control of Communicable Diseases Manual (CCDM), for "Control of patient, contacts and the immediate environment".

Child care contacts:
Persons attending or working at child care centers are at moderate risk for infection. Antimicrobial chemoprophylaxis is not recommended for contacts of children with invasive pneumococcal disease, regardless of their immunization status in out-of-home care.

Daily chemoprophylaxis is recommended for certain groups, such as children with functional or anatomic asplenia or children with sickle cell anemia (see Red Book for details).

Isolation of the Hospital Patient:
Standard precautions are recommended, including for patient with infections caused by drug-resistant *S. pneumoniae*.

Laboratory Procedures

Diagnosis is usually made by isolation of the organism from body sites that are normally sterile. The Missouri State Public Health Laboratory does not routinely test for *S. pneumoniae* or perform antimicrobial sensitivity studies.

Reporting Requirements

Streptococcus pneumoniae, drug-resistant invasive disease is a Category II disease and shall be reported to the local health authority or to the Missouri Department of Health and Senior Services (DHSS) within (3) days of first knowledge or suspicion by telephone (800) 392-0272, facsimile or other rapid communication.

1. For all confirmed or probable *S. pneumoniae*, drug-resistant, invasive disease cases in persons ≥5 years of age complete a "Disease Case Report" (CD-1) and complete the CDC form "**Streptococcus Pneumoniae Surveillance Worksheet**".
    a. For *S. pneumoniae*, drug-resistant, invasive disease in children <5 years old, with documented receipt of pneumococcal conjugate vaccine complete the CDC forms, "**Pneumococcal Conjugate Vaccine Failure Case Report**" and the "**Streptococcus Pneumoniae Surveillance Worksheet**".
    b. For *S. pneumoniae*, drug-resistant, invasive disease in children <5 years old with **no** documented receipt of pneumococcal conjugate vaccine complete the CDC form, "**Streptococcus Pneumoniae Surveillance Worksheet**".
2. Entry of the completed CD-1 into the MOHSIS database negates the need for the paper CD-1 to be forwarded to the Regional Health Office.
3. Send the completed secondary investigation form(s) to the Regional Health Office.
4. All outbreaks or "suspected" outbreaks must be reported as soon as possible (by phone, fax or e-mail) to the Regional Communicable Disease Coordinator. This can be accomplished by completing the Missouri Outbreak Surveillance Report (CD-51).
5. Within 90 days from the conclusion of an outbreak, submit the final outbreak report to the Regional Communicable Disease Coordinator.

References

1. J. Chin, ed. "Pneumococcal Pneumonia". Control of Communicable Diseases Manual, 17th ed. Washington, D.C.: American Public Health Association, 2000: 387-390
2. American Academy of Pediatrics. "Pneumococcal Infections". In: Pickering LK, ed. *Red Book*: *2003 Report of the Committee on Infectious Diseases*. 26th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2003: 490-500
3. Centers for Disease Control and Prevention. Epidemiology Program Office, Division of Public Health Surveillance and Informatics, Nationally Notifiable Infectious Diseases United States 2003: http://www.cdc.gov/epo/dphsi/phs/infdis2003.htm (12/03)
4. G. Mandell, J. Bennett, R. Dolin, eds. "*Streptococcus pneumoniae*". Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseaes; 5th ed., Vol. 2, 2000: 2128-2144; 3218-3219

5. W. Atkinson, C. Wolfe, eds. "Pneumococcal Disease". Epidemiology and Prevention of Vaccine-Preventable Diseases, 7th ed. Centers for Disease Control and Prevention 2002: 205-217

Other Sources of Information

1. Bacterial Infections of Humans Epidemiology and Control; 3rd Edition: Edited by Evans and Brachman: pages 559-582, 673-711
2. Infection Control in the Child Care Center and Preschool; 4th Edition, 1999, Edited by Donowitz: pages 235-237
3. Defining the Public Health Impact of Drug-Resistant Streptococcus pneumoniae: Report of a Working Group: Feb 16, 1996;Vol. 45; No. RR-1

Web Sites

1. Centers for Disease Control and Prevention, "Drug-Resistant *Streptococcus pneumoniae* Disease, Technical Information," http://www.cdc.gov/ncidod/dbmd/diseaseinfo/drugresisstreppneum_a.htm (11/03)
2. Missouri Department of Health and Senior Services, "*Streptococcus pneumoniae*, Invasive Disease in Children less than 5 years of age," http://www.dhss.state.mo.us/Publications/CDManual/CDManual.htm (12/03)

Pneumococcal Disease

Fact Sheet

What is pneumococcal disease?

Pneumococcal diseases are infections caused by the bacterium *Streptococcus pneumoniae*, also known as pneumococcus. The most common types of infections caused by this bacterium include middle ear infections, pneumonia, blood stream infections (bacteremia), sinus infections, and meningitis.

Who gets pneumococcal disease?

Although anyone can get pneumococcal disease, it tends to occur in the elderly or in people with serious underlying medical conditions such as chronic lung, heart or kidney disease. Children under two, children in group child care, and children who have certain illnesses (e.g., sickle cell disease, HIV infection, chronic heart or lung conditions) are at higher risk than other children to get pneumococcal disease. In addition, pneumococcal disease is more common among children of certain racial or ethnic groups, such as Alaska Natives, Native Americans, and African-Americans, than among other groups. Others at risk include alcoholics, diabetics, people with weakened immune systems and those without a spleen.

How is the disease transmitted?

The bacteria are spread through contact between persons who are ill or who carry the bacteria in their throat. Transmission is mostly through the spread of respiratory droplets from the nose or mouth of a person with a pneumococcal infection. It is common for people, especially children, to carry the bacteria in their throats without being ill from it.

When does pneumococcal disease occur?

Infections occur most often during the winter and early spring and less frequently during the summer.

What are the symptoms?

Meningitis: High fever, headache, and stiff neck are common symptoms of meningitis in anyone over the age of two years. These symptoms can develop over several hours, or they may take one to two days. Other symptoms may include nausea, vomiting, discomfort looking into bright lights, confusion, and sleepiness. In newborns and small infants, the classic symptoms of fever, headache, and neck stiffness may be absent or difficult to detect, and the infant may only appear to be slow, inactive, or irritable, have vomiting, or feed poorly.

Pneumonia: In adults, pneumococcal pneumonia is often characterized by sudden onset of illness with symptoms including shaking chills, fever, shortness of breath or rapid breathing, pain in the chest that is worsened by breathing deeply, and a productive cough. In infants and young children, signs and symptoms may not be specific, and may include fever, cough, rapid breathing or grunting.

Otitis media: Children who have otitis media (middle ear infection) typically have a painful ear, and the eardrum is often red and swollen. Other symptoms that may accompany otitis media include sleeplessness, fever and irritability.

Blood stream infections: Infants and young children with blood stream infections, also known as bacteremia, typically have non-specific symptoms including fevers and irritability.

How is pneumococcal disease diagnosed?

Doctors are able to diagnose pneumococcal disease based on the type of symptoms exhibited by the patient and specific laboratory cultures of sputum, blood or spinal fluid. Sensitivity studies on the organism can determine drug-resistance and should be performed.

How is it treated?

Pneumococcal disease is treated with antibiotics. Over the past decade, many pneumococci have become resistant to some of the antibiotics used to treat pneumococcal infections; high levels of resistance to penicillin are common.

Is there a vaccine to prevent infection?

Yes. A new pneumococcal conjugate vaccine has been shown to be highly effective in preventing invasive pneumococcal disease in infants and toddlers. The vaccine should be given to all infants <24 months of age at two, four, and six months of age, followed by a booster dose at 12-15 months of age.

Pneumococcal polysaccharide vaccines, for the prevention of disease among adults and children who are two years and older, have been in use since 1977. The vaccines are currently recommended for use in all adults who are >65 years of age, and for persons who are two years and older and at high risk for disease such as persons with sickle cell disease, HIV infection, or other immunocompromising conditions.

Anyone at high risk for disease or in high-risk categories (e.g. immunocompromising conditions) should consult their health care provider about pneumococcal vaccine.

Missouri Department of Health & Senior Services
Section for Communicable Disease Prevention
Phone: (866) 628-9891

MISSOURI DEPARTMENT OF HEALTH AND SENIOR SERVICES

DISEASE CASE REPORT

REPORT TO LOCAL PUBLIC HEALTH AGENCY

1 DATE OF REPORT	**2** DATE RECEIVED BY LOCAL HEALTH AGENCY
_____ / _____ / _____	_____ / _____ / _____

3 NAME (LAST, FIRST, M.I.)	**4** GENDER ☐ MALE ☐ FEMALE	**5** DATE OF BIRTH _____ / _____ / _____	**6** AGE	**7** HISPANIC ☐ YES ☐ NO ☐ UNKNOWN

8 RACE (CHECK ALL THAT APPLY) ☐ BLACK ☐ ASIAN ☐ PACIFIC ISLANDER ☐ WHITE ☐ AMERICAN INDIAN ☐ UNKNOWN	**9** PATIENT'S COUNTRY OF ORIGIN	**10** DATE ARRIVED IN USA _____ / _____ / _____

11 ADDRESS (STREET OR RFD, CITY, STATE, ZIP CODE)	**12** COUNTY OF RESIDENCE	**13** TELEPHONE NUMBER ( )

14 PREGNANT ☐ YES (IF YES NUMBER OF WEEKS _____) ☐ NO ☐ UNKNOWN	**15** PARENT OR GUARDIAN	**16** RECENT TRAVEL OUTSIDE OF MISSOURI OR USA ☐ YES ☐ NO IF YES, WHERE _____	**17** DATE OF RETURN _____ / _____ / _____

18 OCCUPATION	**19** SCHOOL/DAY CARE/WORKPLACE ADDRESS (STREET OR RFD, CITY, STATE, ZIP CODE)

20 WORK TELEPHONE NUMBER ( )	**21** OTHER ASSOCIATED CASES ☐ YES ☐ NO ☐ UNKNOWN IS REPORT PART OF AN OUTBREAK ☐ YES ☐ NO ☐ UNKNOWN	**22** TYPE OF COMPLAINT/OUTBREAK ☐ FOODBORNE ☐ WATERBORNE ☐ OTHER (SPECIFY) _____

23 WAS PATIENT HOSPITALIZED ☐ YES ☐ NO ☐ UNKNOWN	**24** PATIENT RESIDE IN NURSING HOME ☐ YES ☐ NO ☐ UNKNOWN	**25** PATIENT DIED OF THIS ILLNESS ☐ YES ☐ NO ☐ UNKNOWN

26 CHECK BELOW IF PATIENT OR MEMBER OF PATIENT'S HOUSEHOLD (HHLD):	PATIENT			HHLD MEMBER		
	YES	NO	UNK	YES	NO	UNK
IS A FOOD HANDLER						
ATTENDS OR WORKS AT A CHILD OR ADULT DAY CARE CENTER						
IS A HEALTH CARE WORKER						

27 NAME OF HOSPITAL/NURSING HOME	
28 HOSPITAL/NURSING HOME ADDRESS (STREET OR RFD, CITY, STATE, ZIP CODE)	
29 REPORTER NAME	**30** TELEPHONE NUMBER ( )

31 REPORTER ADDRESS (STREET OR RFD, CITY, STATE, ZIP CODE)	**32** TYPE OF REPORTER/SUBMITTER ☐ PHYSICIAN ☐ OUTPATIENT CLINIC ☐ PUBLIC HEALTH CLINIC ☐ HOSPITAL ☐ LABORATORY ☐ SCHOOL ☐ OTHER _____

33 ATTENDING PHYSICIAN/CLINIC NAME ADDRESS (STREET OR RFD, CITY, STATE, ZIP CODE)	**34** TELEPHONE NUMBER ( )

35 DISEASE NAME(S)	**36** ONSET DATE(S) _____ / _____ / _____ _____ / _____ / _____	**37** DIAGNOSIS DATE(S) _____ / _____ / _____ _____ / _____ / _____	**38** DISEASE STAGE/ RISK FACTOR	**39** PREVIOUS DISEASE/STAGE	**40** PREVIOUS DISEASE DATE(S) _____ / _____ / _____ _____ / _____ / _____

41 - DIAGNOSTICS

TEST DATE (MO/DAY/YR)	TYPE OF TEST	SPECIMEN TYPE	COLLECTION DATE (MO/DAY/YR)	QUALITATIVE / QUANTITATIVE RESULTS	REFERENCE RANGE	LABORATORY NAME/ADDRESS (INCLUDE STREET OR RFD, CITY, STATE, ZIP CODE)

42 - TREATMENTS

TREATED (Y/N/UNK)	REASON NOT TREATED	TYPE OF TREATMENT	DRUG	DOSAGE	TREATMENT DATE (MO/DAY/YR)	TREATMENT DURATION (IN DAYS)	PREVIOUS TREATMENT	PREVIOUS LOCATION (LIST CITY, STATE)

43 - SYMPTOMS

SYMPTOM (IF APPLICABLE)	SYMPTOM SITE (IF APPLICABLE)	SYMPTOM ONSET DATE (MO/DAY/YR)	SYMPTOM DURATION (IN DAYS)

44 COMMENTS

NOTES FOR ALL RELEVANT SECTIONS:

- Stages, risk factors, diagnostics, treatments, and symptoms shown below are examples. To see a more complete listing, please go to ***http://www.dhss.state.mo.us/Diseases/DDwelcome.htm***. You may also contact the Office of Surveillance at 1-800-392-0272 for additional information or to report a case.
- All dates should be in Mo/Day/Year (01/01/2001) format.
- All complete addresses should include city, state and zip code.
- Required fields referenced below are italicized and bold, however fill form as complete as possible.

(1) Date of Report -- date sent by submitter of document.

(2) Date received will be filled in by receiving agency.

(3-8) **CASE DEMOGRAPHICS/IDENTIFIERS:** ***Last name, First Name,*** Gender, ***Date of Birth,*** Hispanic, Race - please check all that apply

(23) Was patient hospitalized due to this illness?

(32) Type of reporter/submitter (doctor, nursing home, hospital, laboratory) (33-34) Attending physician or clinic (full physician name and degree, address, phone)

DISEASE: ***(35) Disease name or name(s), (36) Onset date(s), (37) Diagnosis Date(s)***

(38) Disease Stage or Risk Factor

Syphilis	**Gonorrhea or Chlamydia**	**TB Infection**
Primary (chancre present)	Asymptomatic	Contact to TB case
Secondary (skin lesions, rash)	Uncomplicated urogenital (urethritis, cervicitis)	Immunocompromised
Early Latent (asymptomatic < 1 year)	Salpingitis (PID)	Abnormal CXR
Late Latent (over 1 year duration)	Ophthalmia/conjunctivitis	Foreigner/Immigrant
Neurosyphilis	Other (arthritis, skin lesions, etc)	IV Drug/Alcohol Abuse
Cardiovascular		Resident, correctional
Congenital		Employee, correctional
Other		Over 70
		Homeless
		Diabetes
		Healthcare worker
		Converter/2 yrs ≥ 10
		Converter/2 yrs ≥ 15

(39) Previous Disease/Stage (if applicable) ***(40) Previous Disease Dates (if applicable)***

(41) Diagnostics (Please Attach Lab Slip)

Test Type

Hepatitis	**TB**	**Other**
Igm Anti-HBc	Not Done	Elisa
Anti-HBs	Mantoux	Western Blot
Anti-HBc Total	Multiple puncture device	Culture
Igm Anti-HAV	X-Ray	ALT
HBsAg	Smear	AST
Hep C	Culture	

Specimen Type (blood, urine, CSF, smear, swab), **Collection Date** (Mo/Day/Yr), **Qualitative** (negative, positive, reactive), **Quantitative Results** (1:1, 2.0 mm reading,) **Reference Range** (1:1neg, 1:64 equivocal, 1:128 positive, > 2 positive), **Laboratory** (name, address)

(42) TREATMENT

Reason not treated	**Drug**
False positive	**TB**
Previous treated	Isoniazid
Age	Ethambutol
	Pyrazinamide
	Rifampin

(43) SYMPTOMS:

Symptom (jaundice, fever, dark urine, headache) **Symptom Site** (head, liver, lungs, skin), **Symptom Onset Date** (Mo/Day/Yr) and **Symptom Duration** (in days)

(44) **Comments:** Attach additional sheets if more comments needed.

For Local Use Only

STREPTOCOCCUS PNEUMONIAE SURVEILLANCE WORKSHEET

Patient's Name _____ (LAST / FIRST / MIDDLE) Phone Number _____ (AREA CODE + 7 DIGITS)

Current Address _____ (NUMBER / STREET / APT. NUMBER / CITY / STATE / ZIP CODE) Hospital _____ Patient Chart Number _____

Detatch here — Patient identifier information is not transmitted to CDC

STREPTOCOCCUS PNEUMONIAE SURVEILLANCE WORKSHEET

(Invasive pneumococcal disease and drug-resistant *S. pneumoniae*)

Throughout: Y=Yes N=No U=Unknown

1. **Are you reporting:**
   Drug Resistant *S. pneumoniae* Y☐ N☐ U☐
   Invasive Disease Y☐ N☐ U☐
2. **Date of birth:** ☐☐ (MONTH) ☐☐ (DAY) ☐☐☐☐ (YEAR)
3a. **Age:** ☐☐☐
3b. **Is age in years/months/weeks/days?**
   ☐ Yrs. ☐ Mos. ☐ Wks. ☐ Days
4. **Sex:** M☐ Male F☐ Female U☐ Unknown
5. **Race:** *(check all that apply)*
   - ☐ American Indian/Alaskan Native
   - ☐ Asian
   - ☐ Black or African American
   - ☐ Native Hawaiian or Pacific Islander
   - ☐ White
   - ☐ Other Race *(specify)* _____
6. **Ethnicity: Is patient Hispanic or Latino?**
   Y☐ N☐ U☐
7. **State in which patient resided at time of diagnosis:** ☐☐
8. **ZIP code at which patient resided at time of diagnosis:** ☐☐☐☐☐

9a. **Hospitalized?** Y☐ N☐ U☐

9b. **If hospitalized for this condition, how many days total was the patient hospitalized?**
(Include days from multiple hospitals if relevant.)
☐☐☐ NUMBER OF DAYS: 0-998; 999=UNKNOWN

10. **Does this patient:** *(check all that apply)*
   Attend a day care* facility? Y☐ N☐ U☐
   Facility name _____
   *DAY CARE IS DEFINED AS A SUPERVISED GROUP OF 2 OR MORE UNRELATED CHILDREN FOR >4 HOURS PER WEEK.
   Reside in a long-term care facility? Y☐ N☐ U☐
   Facility name _____
11. **Did patient die from this illness?** Y☐ N☐ U☐
12. **Onset date:** ☐☐ (MONTH) ☐☐ (DAY) ☐☐☐☐ (YEAR)
13. **Type of infection caused by organism:** *(check all that apply)*
   - **Bacteremia without focus** ☐
   - **Cellulitis** ☐

Item 13 continues next column

13. **Type of infection caused by organism (cont.):**
   - **Epiglottitis** ☐
   - **Hemolytic uremic syndrome** ☐
   - **Meningitis** ☐
   - **Osteomyelitis** ☐
   - **Otitis media** ☐
   - **Peritonitis** ☐
   - **Pericarditis** ☐
   - **Pneumonia** ☐
   - **Septic arthritis** ☐
   - **Other** ☐

   (specify) _____
14. **Sterile site from which organism isolated:**
(check all that apply)

Blood	☐	**Joint**	☐
CSF	☐	**Bone**	☐
Pleural fluid	☐	**Internal body site**	☐
Peritoneal fluid	☐	**Muscle**	☐
Pericardial fluid	☐	**Other normally sterile site** *(specify)*	☐

_____

15. **Date first positive culture obtained:**
DATE SPECIMEN TAKEN ☐☐ (MONTH) ☐☐ (DAY) ☐☐☐☐ (YEAR)
16. **Nonsterile sites from which organism isolated, if any:**
   - **Middle Ear** ☐
   - **Sinus** ☐
   - **Other** ☐

   (specify) _____
17a. **Does the patient have any underlying medical conditions or prior illness?**
   Y☐ **YES.** If yes, fill out 17b.
   N☐ **NO.** If no, skip to 18.
   U☐ **UNKNOWN.** Skip to 18.
17b. **What underlying medical conditions does the patient have?** *(check all that apply)*
   - **Current smoker** ☐
   - **Multiple myeloma** ☐
   - **Sickle cell anemia** ☐
   - **Splenectomy/asplenia** ☐
   - **Immunoglobulin deficiency** ☐
   - **Immunosuppressive therapy** (steroids, chemotherapy, radiation) ☐
   - **Leukemia** ☐

Item 17b continues on back

17b. **What underlying medical conditions does the patient have (cont.)?**

Hodgkin's disease	☐	**Cirrhosis/liver failure**	☐
Asthma	☐	**Alcohol abuse**	☐
Emphysema/COPD	☐	**Cardiovascular disease (ASCVD)/CAD**	☐
Systemic lupus erythematosus	☐	**Heart failure/CHF**	☐
Diabetes mellitus	☐	**CSF leak**	☐
Nephrotic syndrome	☐	**Intravenous Drug Use**	☐
Renal failure/dialysis	☐	**Other malignancy** *(specify)* _____	☐
HIV infection	☐	**Organ/bone marrow transplant**	☐
AIDS (CD4<200)	☐	**Other prior illness** *(specify)* _____	☐

VACCINATION HISTORY

18. **Did patient receive POLYSACCHARIDE pneumococcal vaccine?** Y ☐ N ☐ U ☐ **If YES, please complete the list below.**

DOSE	DATE GIVEN (Month/Day/Year)	VACCINE NAME	LOT NUMBER
1	☐☐-☐☐-☐☐☐☐	☐ Pneumovax 23 (Merck) ☐ Pnu-Imune23 (Wyeth) ☐ Other_____ ☐ Unknown	
2	☐☐-☐☐-☐☐☐☐	☐ Pneumovax 23 (Merck) ☐ Pnu-Imune23 (Wyeth) ☐ Other_____ ☐ Unknown	
3	☐☐-☐☐-☐☐☐☐	☐ Pneumovax 23 (Merck) ☐ Pnu-Imune23 (Wyeth) ☐ Other_____ ☐ Unknown	

19. **Did patient receive CONJUGATE pneumococcal vaccine?** Y ☐ N ☐ U ☐ **If YES, please complete the list below.**

DOSE	DATE GIVEN (Month/Day/Year)	VACCINE NAME	MANUFACTURER	LOT NUMBER
1	☐☐-☐☐-☐☐☐☐			
2	☐☐-☐☐-☐☐☐☐			
3	☐☐-☐☐-☐☐☐☐			
4	☐☐-☐☐-☐☐☐☐			

20. RESISTANCE TESTING RESULTS

Oxacillin zone size: (valid 00-30) ☐☐ mm **Oxacillin interpretation:** ☐ R<20mm (possibly resistant) ☐ S>=20mm (susceptible) ☐ Unknown/not tested

SUSCEPTIBILITY METHOD CODES	S/I/R RESULT CODES		SIGN CODES	MIC VALUE
A – AGAR: Agar dilution method **B** – BROTH: Broth dilution **D** – DISK: Disk diffusion (Kirby Bauer) **S** – STRIP: Antimicrobial gradient strip (E-test)	**S** – SUSCEPTIBLE **I** – INTERMEDIATE **R** – RESISTANT **U** – UNK./NOT TESTED	Result indicates whether the micro-organism is susceptible or not susceptible (intermediate or resistant) to the antimicrobial being tested.	Indicate whether the MIC is **<**, **>**, **≥**, **≤**, or **=** to the numerical MIC value in the last column.	Valid range for data value 0.000-999.999 MIC=minimum inhibitory concentration

21. ANTIMICROBIAL AGENT	SUSCEPTIBILITY METHOD A/B/D/S	S/I/R/U RESULT	SIGN <>/≥/≤/=	MIC VALUE *(e.g., 0.06 ug/ml)*
Penicillin				
Amoxicillin				
Amoxicillin/clavulanic acid				
Cefotaxime				
Ceftriaxone				
Cefuroxime				
Vancomycin				
Erythromycin				
Azithromycin				
Tetracycline				
Levofloxacin				
Sparfloxacin				
Gatifloxacin				
Moxifloxacin				
Trimethoprim/sulfamethoxazole				
Clindamycin				
Quinupristin/dalfopristin				
Linazolid				
Other: *(list)*				

Submitted by: _____ Phone: (____) _____ Date: ☐☐-☐☐-☐☐☐☐ DAY MONTH YEAR

Patient's Name: _____ (Last, First, M.I.) Phone No.: _____ Hospital/Lab: _____

Address: _____ (Number, Street, Apt. No., City, State) _____ (Zip Code) Patient. Chart No.: _____

Patient identifier information is not transmitted to CDC

DEPARTMENT OF HEALTH & HUMAN SERVICES
Centers for Disease Control and Prevention (CDC)
Atlanta, Georgia 30333

Pneumococcal Conjugate Vaccine Failure Case Report

CDC SAFER·HEALTHIER·PEOPLE™

Use for children < 5 years old with a sterile site pneumococcal isolate and documented receipt of pneumococcal conjugate vaccine

Submitted by (name): Email _____ _____

(_____) _____ Phone (_____) _____ Fax

Physician's name: Email _____ _____

(_____) _____ Phone (_____) _____ Fax

– DEMOGRAPHIC SECTION –

1. Patient's Residence: State ☐☐ County _____

2. Date of Birth: Mo. ☐☐ Day ☐☐ Year ☐☐☐☐

3. Sex: 1 ☐ Male 2 ☐ Female

4. Race: 1 ☐ White 2 ☐ Black 3 ☐ American Indian/ Alaskan Native 4 ☐ Asian 5 ☐ Pacific Islander 9 ☐ Unk

5. Ethnic Origin: 1 ☐ Hispanic 2 ☐ Not Hispanic 9 ☐ Unk

– MEDICAL SECTION –

6. Pneumococcal illness onset date: Mo. ☐☐ Day ☐☐ Year ☐☐☐☐

7a. Was patient hospitalized? 1 ☐ Yes 0 ☐ No 9 ☐ Unk

7b. If yes, name of hospital: _____ City _____ State ☐☐

7c. Date of Admission: Mo. ☐☐ Day ☐☐ Year ☐☐☐☐

7d. Date of Discharge: ☐☐ ☐☐ ☐☐☐☐

8. Outcome: 1 ☐ Survived 2 ☐ Died 9 ☐ Unk

9. Type of infection (check all that apply)

- 1 ☐ Bacteremia (without focus)
- 1 ☐ Meningitis
- 1 ☐ Empyema
- 1 ☐ Hemolytic uremic syndrome (HUS)
- 1 ☐ Pneumonia
- 1 ☐ Otitis Media
- 1 ☐ Septic arthritis
- 1 ☐ Osteomyelitis
- 1 ☐ Pericarditis
- 1 ☐ Abscess
- 1 ☐ Peritonitis
- 1 ☐ Cellulitis
- 1 ☐ Other (specify) _____

10. Site of positive culture (check all that apply)

- 1 ☐ Blood
- 1 ☐ CSF
- 1 ☐ Pleural fluid
- 1 ☐ Pericardial fluid
- 1 ☐ Bone
- 1 ☐ Surgical specimen
- 1 ☐ Peritoneal fluid
- 1 ☐ Surgical aspirate
- 1 ☐ Joint
- 1 ☐ other (specify) _____

11. Culture date: Mo. ☐☐ Day ☐☐ Year ☐☐☐☐

12. Underlying illness or risk factors for pneumococcal infection (check all that apply)

- 1 ☐ Sickle cell disease
- 1 ☐ Solid organ or hematologic malignancy
- 1 ☐ Asplenia (congenital or acquired)
- 1 ☐ Congenital immunodeficiency
- 1 ☐ Hypogammaglobulinemia
- 1 ☐ HIV infection (if yes, last CD4 count: _____)
- 1 ☐ Invasive bacterial infection since birth (If yes, organism _____)
- 1 ☐ Solid organ transplant
- 1 ☐ Bone marrow transplant
- 1 ☐ Cerebrospinal fluid leak/shunt
- 1 ☐ Renal failure
- 1 ☐ Chronic lung disease
- 1 ☐ Diabetes mellitus
- 1 ☐ Prematurity (if yes, gestational age at birth: _____ weeks)
- 1 ☐ Nephrotic syndrome
- 1 ☐ Cardiac disease
- 1 ☐ Other (specify) _____

13a. Has patient been evaluated for an immune disorder? 1 ☐ Yes 0 ☐ No 9 ☐ Unk

13b. If yes:

Tests	Test Date (Mo. ☐☐ Day ☐☐ Year ☐☐☐☐)	Result		
Quantitative Immunoglobulin				
IgG		☐ Normal	☐ Abnormal	☐ Unknown
IgM		☐ Normal	☐ Abnormal	☐ Unknown
IgA		☐ Normal	☐ Abnormal	☐ Unknown
Complement Assays				
C3		☐ Normal	☐ Abnormal	☐ Unknown
C4		☐ Normal	☐ Abnormal	☐ Unknown
CH50		☐ Normal	☐ Abnormal	☐ Unknown
Specific Function (specify _____)		☐ Normal	☐ Abnormal	☐ Unknown
Other (specify _____)		☐ Normal	☐ Abnormal	☐ Unknown

– PNEUMOCOCCAL CONJUGATE VACCINE FAILURE CASE REPORT –

-- Patient identifier information is not transmitted to CDC --

– VACCINE HISTORY SECTION –

Vaccine*	Date	Manufacturer	Vaccine Name**	Lot #
14. Conjugate Pneumococcal #1				
#2				
#3				
#4				
15. Polysaccharide Pneumococcal #1				
#2				
16. Influenza #1				
#2				
#3				
#4				
17. Hib #1				
#2				
#3				
#4				
18. DTaP #1				
#2				
#3				
#4				
19. IPV #1				
#2				
#3				
#4				
20. MMR #1				
#2				
21. Hepatitis B #1				
#2				
#3				
22. Hepatitis A #1				
#2				
23. Varicella #1				
#2				
24. Other				
(specify _____)				
25. Other				
(specify _____)				

*For combination vaccines (e.g., Comvax, Tetramine, TriHIBit) enter information for each vaccine component

**Please give manufacturer's vaccine name: (e.g., Prevnar, Pneumovax , Pnu-Imune, HibTITER, ProHIBIT, ActHIB, etc.)

27. Name of laboratory where isolate is located:

_____

Phone: ( ) _____

Fax: ( ) _____

28. Date of Report: Mo. ☐☐ Day ☐☐ Year ☐☐☐☐

29a. Has this case been reported elsewhere?

1 ☐ Yes 0 ☐ No 9 ☐ Unk

29b. If yes, to whom?

1 ☐ Vaccine manufacturer 2 ☐ FDA (MedWatch) 3 ☐ VAERS 8 ☐ Other _____

Please return form with isolate to:

Centers for Disease Control and Prevention
NCID, DBMD, RDB, Streptococcus Laboratory
1600 Clifton Road N.E.; M/S C-02
Atlanta, GA 30333

tel: 404-639-2215
fax: 404-639-3970

(A report of the Laboratory Investigation will be returned if a return address and patient name are completed on CDC 3.203)

CDC use only

Case ID number _____

Serotype _____

Lab ID _____

Where serotyped:

☐ CDC ☐ AIP ☐ MDH

☐ Other: _____